

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE (DD-MM-YYYY)

2. REPORT TYPE

Technical Paper

3. DATES COVERED (From - To)

4. TITLE AND SUBTITLE

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

Please see attached

5d. PROJECT NUMBER

1011

5e. TASK NUMBER

00VA

5f. WORK UNIT NUMBER

346242

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Thiokol

8. PERFORMING ORGANIZATION REPORT

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Air Force Research Laboratory (AFMC)

AFRL/PRS

5 Pollux Drive

Edwards AFB CA 93524-7048

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S NUMBER(S)

Please see attached

12. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

20030205 286

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:

a. REPORT

Unclassified

b. ABSTRACT

Unclassified

c. THIS PAGE

Unclassified

17. LIMITATION OF ABSTRACT

A

18. NUMBER OF PAGES

19a. NAME OF RESPONSIBLE PERSON

Leilani Richardson

19b. TELEPHONE NUMBER (include area code)

(661) 275-5015

101100UA

MEMORANDUM FOR PRR (Contractor Publication)

FROM: PROI (TI) (STINFO)

31 January 2000

SUBJECT: Authorization for Release of Technical Information, Control Number: AFRL-PR-ED-AB-2000-025
Lester., et al. (Thiokol), "Solar Thermal IHPRT Demonstration Program"

AIAA Space 2000
(Long Beach CA, 19 Sep 2000) (Deadline: 08 Feb 00)

(Statement A)

1. This request has been reviewed by the Foreign Disclosure Office for: a.) appropriateness of distribution statement, b.) military/national critical technology, c.) export controls or distribution restrictions, d.) appropriateness for release to a foreign nation, and e.) technical sensitivity and/or economic sensitivity.

Comments: _____

Signature _____ Date _____

2. This request has been reviewed by the Public Affairs Office for: a.) appropriateness for public release and/or b) possible higher headquarters review.

Comments: _____

Signature _____ Date _____

3. This request has been reviewed by the STINFO for: a.) changes if approved as amended, b.) appropriateness of distribution statement, c.) military/national critical technology, d.) economic sensitivity, e.) parallel review completed if required, and f.) format and completion of meeting clearance form if required

Comments: _____

Signature _____ Date _____

4. This request has been reviewed by PR for: a.) technical accuracy, b.) appropriateness for audience, c.) appropriateness of distribution statement, d.) technical sensitivity and economic sensitivity, e.) military/national critical technology, and f.) data rights and patentability

Comments: _____

APPROVED/APPROVED AS AMENDED/DISAPPROVED

LAWRENCE P. QUINN
Technical Advisor
Rocket Propulsion Division

DATE

Solar Thermal Propulsion IHPRT Demonstration Program

D.M. Lester, S.R. Wassom, *KENT JENSEN*
Thiokol Propulsion
Brigham City, UT

J. C. Pearson
SRS Technologies
500 Discovery Drive
Huntsville AL

M. R. Holmes
Air Force Research Laboratory
4 Draco Drive. (PRRS)
Edwards AFB, CA

Abstract

Spacecraft powered by solar thermal propulsion engines will be able to provide the velocity change required to economically maneuver large payloads from one orbit to another or to perform interplanetary missions. This innovative concept, when applied, will double the efficiency of currently used LH₂ – LO₂ chemical upper stages. Solar thermal propulsion uses the sun's energy to heat a low molecular weight working fluid such as hydrogen to very high temperatures (3,000 K). The stored thermal energy is then converted to kinetic energy as the working fluid exits a diverging nozzle.

(AFRL)

define
Under(IHPRT)funding, The Air Force Research Lab has sponsored the team of Thiokol Propulsion and SRS Technologies to demonstrate the technological readiness and performance of an inflatable solar thermal propulsion system. This paper will address the current status of this program, which includes the following accomplishments:

- Component trade studies completed for struts, torus, lenticular
- Rapid prototyping and hardware-in-the-loop system installed and verified
- Inflation control system designed, fabricated, and tested in both ambient and space environments
- Integrated system fabricated and deployed in space environment
- Sun sensors for focus control system fabricated and tested
- Conceptual design and 3-D dynamic model made of focus control system
- Modal testing of inflatable concentrator completed in ambient conditions

The program will culminate in a full-up integrated proof-of-concept ground test. This will demonstrate that the technology is ready for development of the flight hardware for the AFRL Solar Orbital Transfer Vehicle (SOTV) program.

DISTRIBUTION STATEMENT A
Approved for Public Release
Distribution Unlimited

